

Appl. No. 10/726,134  
Amdt. dated March 21, 2006  
Reply to Office action of September 21, 2005

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1 (currently amended) A ligand detection device comprising:

~~at least one~~ a plurality of substrate particles;

at least one receptor attached to each of said plurality of substrate particles, wherein said at least one receptor is capable of binding at least one ligand to form a receptor-ligand complex; wherein the ~~at least one~~ plurality of substrate particles ~~[[is]]~~ are positioned and moveable within an amount of a liquid crystalline material having the at least one ligand therein, wherein upon formation of said receptor-ligand complex, optical characteristics of said liquid crystalline material are altered to allow detection of said at least one ligand.

Claim 2 (currently amended) The device of claim 1, wherein said at least one receptor is attached to the surface of each of said plurality of substrate particles.

Claim 3 (currently amended) The device of claim 1, wherein ~~[[the]]~~ each of the plurality of substrate particles is a porous substrate and said at least one receptor is attached to at least one pore of a porous ~~substrate~~ particle.

Claim 4 (currently amended) The device of claim 3, wherein a plurality of receptors are attached to and randomly distributed on the surface and within the pores of said porous ~~substrate~~ particle.

Claim 5 (original) The device of claim 1, wherein the liquid crystalline material is selected from the group consisting of thermotropic liquid crystalline material and lyotropic liquid crystalline material.

Claim 6 (original) The device of claim 5, wherein the liquid crystalline material is a lyotropic liquid crystalline material.

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Claim 7 (original) The device of claim 6, wherein the lyotropic liquid crystalline material is a lyotropic chromonic liquid crystalline material.

Claim 8 (original) The device of claim 5, wherein the liquid crystalline material is a thermotropic liquid crystalline material.

Claim 9 (currently amended) The device of claim 1, wherein the plurality of substrate particles ~~[[is]]~~ are made from a material selected from the group consisting of polymeric and inorganic materials.

Claim 10 (original) The device of claim 9, wherein the polymeric materials are selected from the group consisting of polyions, polyalkenes, polyacrylates, polymethacrylates, polyvinyls, polystyrenes, polycarbonates, polyesters, polyurethanes, polyamides, polyimides, polysulfones, polysiloxanes, polysilanes, polyethers, and polycarboxylates.

Claim 11 (previously presented) The device of claim 9, wherein the polymeric material is a polystyrene.

Claim 12 (currently amended) The device of claim 1, wherein the ~~substrate particles is a~~ substrate particles are substantially spherical.

Claim 13 (currently amended) The device of claim 9, where the plurality of substrate particles ~~[[is]]~~ are made from an inorganic material selected from the group consisting of glass, silicon, and colloidal gold.

Claim 14 (original) The device of claim 13, wherein the inorganic material is glass.

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Claim 15 (currently amended) The device of claim 1, wherein said at least one receptor is attached to each of said plurality of substrate particles by at least one ~~means~~ mechanism selected from the group consisting of (i) chemical attachment and (ii) physical attachment.

Claim 16 (original) The device of claim 15, wherein said chemical attachment is covalent bonding.

Claim 17 (previously presented) The device of claim 15, wherein said physical attachment is selected from the group consisting of: hydrophobic interactions and van der Waals interactions.

Claim 18 (currently amended) A method for detecting ligands comprising:

providing a device for detecting ligands, said device comprising ~~at least one~~ a plurality of substrate particles; at least one receptor attached to each of said plurality of substrate particles, wherein said at least one receptor is capable of binding to a ligand to form a receptor-ligand complex, and wherein said plurality of substrate particles ~~[[is]]~~ are positioned within a liquid crystalline material;

contacting a sample with the device, the sample including at least one ligand bindable to the receptor to form the receptor-ligand complex, and

detecting the presence of a ligand by means of a change in the optical characteristics of the liquid crystalline material generated by said receptor-ligand complex formation.

Claim 19 (currently amended) A device for the detection of ligands comprising:

~~at least one~~ a plurality of substantially spherical substrate particles;

at least one receptor attached to each of said plurality of substantially spherical substrate particles, wherein said at least one receptor is capable of binding to a ligand to form a receptor-ligand complex; and

an amplification mechanism comprising a liquid crystalline material, wherein the optical characteristics of the liquid crystalline material vary to detect the presence of said ligands upon receptor-ligand complex formation within the liquid crystalline material.

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Claim 20 (currently amended) A device for detection of a ligand comprising:

an amount of liquid crystalline material, the liquid crystalline material having initial optical transmission characteristics;

~~at least one~~ a plurality of substrate particles positioned in the amount of liquid crystalline material so as to be moveable therein;

at least one ligand receptor associated with the ~~at least one~~ plurality of substrate particles, the ligand receptor capable of attaching to a ligand, wherein upon attachment of a ligand to the receptor, the initial optical characteristics of the liquid crystalline material are altered; and

a detector for detecting a change in the initial optical characteristics of the liquid crystalline material to determine the presence of a ligand.

Claim 21 (currently amended) A method for detecting a ligand comprising the steps of:

providing an amount of liquid crystalline material having initial optical characteristics;

positioning ~~at least one~~ a plurality of substrate particles having at least one ligand receptor associated therewith, the liquid crystalline material so as to be moveable throughout the liquid crystalline material; and

detecting a change from the initial optical characteristics in the liquid crystalline material indicating attachment of at least one ligand to the receptor and the presence of the ligand thereby.